

1    ABSTRACT

2           The invention relates to means and methods for the  
3   orthogonal introduction of ions into a TOF mass spectrometer,  
4   whereby ions from an ion source can be efficiently transferred  
5   via a multipole ion guide such that they can be readily analyzed  
6   in a TOF analyzer. The invention includes first introducing ions  
7   into an ion guide, preferably an RF/DC ion guide, which guides  
8   the ions into a multipole ion trap. Both the ion guide and ion  
9   trap are preferably orthogonal to the flight direction of the TOF  
10   mass spectrometer. By changing the potentials on the electrodes  
11   of the multipole ion trap, the ions may be extracted from the  
12   trap in the direction of the flight region. Also, in accordance  
13   with the invention, the entrance region of the ion guide is held  
14   at moderate pressure to cool the ions to thermal energies. These  
15   ions are cooled due to collisions with neutral background gas  
16   molecules, thus lowering the energy spread of the ions.  
17   Preferably, the invention uses different DC and RF electrodes to  
18   trap and extract ions. By minimizing the energy spread of the  
19   ions, the invention results in improved performance of any TOF  
20   mass spectrometer.